FIELD GUIDEBOOK

to

ENVIRONMENTS OF COAL FORMATION

IN

SOUTHERN FLORIDA

Trip Leaders

William Spackman

David W. Scholl and William H. Taft

Printed for the

GEOLOGICAL SOCIETY OF AMERICA

PRE-CONVENTION FIELDTRIP

November 16, 17, 18, 1964

These "shade grown" trees possess the habit of young counterparts of the Shark River giants and may in fact be such. These unusual growth habits plus the great ecological amplitude of the species, plus the viviparous method of reproduction, make these plants interesting even to the casual observer.

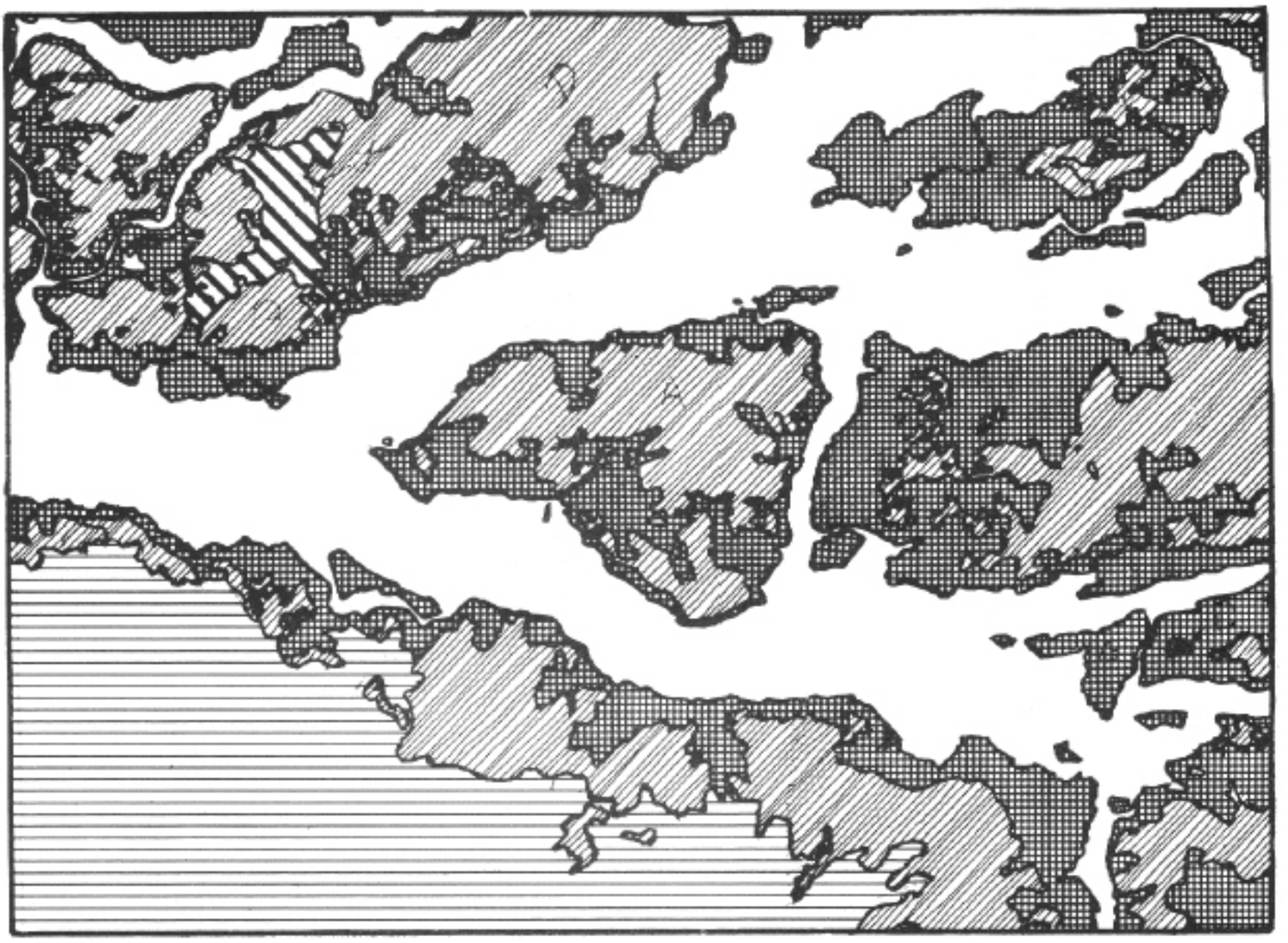
STOP 19: Tarpon Bay Bulrush Site

Objectives:

A. Inspection of a marsh environment dominated by Scirpus.
B. Inspection of remnant saw grass peat mounds on marsh levels supporting Scirpus spp.
C. Discussion of environmental changes occurring upstream from Tarpon Bay.
D. Discussion of element concentration in Scirpus vs Mariscus environments.
E. Discussion of changes in element concentration and pollen content in surface sediments in a transect from marine open water to the fresh-water Everglades.

Discussion:

The map of environments in the Tarpon Bay area (Figure 46) shows only three environments of areal importance in this locality: the open water channels, the streamside forest and the Scirpus - Mariscus marsh. An impression of the height of the mangroves in the streamside forest and the width of this channel-fringing environment in this area can be obtained from the aforementioned figure and Plate XX. The type of marsh shown in the Plate covers large areas in the brackish water zone. Because they are usually concealed to the water traveler by the streamside swamp, they have received little attention in the past. In many places saw grass is much less conspicuous in the environment than it is at Stop 19 and may be completely absent over large areas. As one proceeds inland from this locality, the Scirpus marsh soon disappears and the saw grass and spike-rush environments dominate the marshland area. The streamside forest continues to thin and finally disappears as the Shark River headwaters become indistinguishably a part of the surficial water flow in the Slough area (Plate XXI).

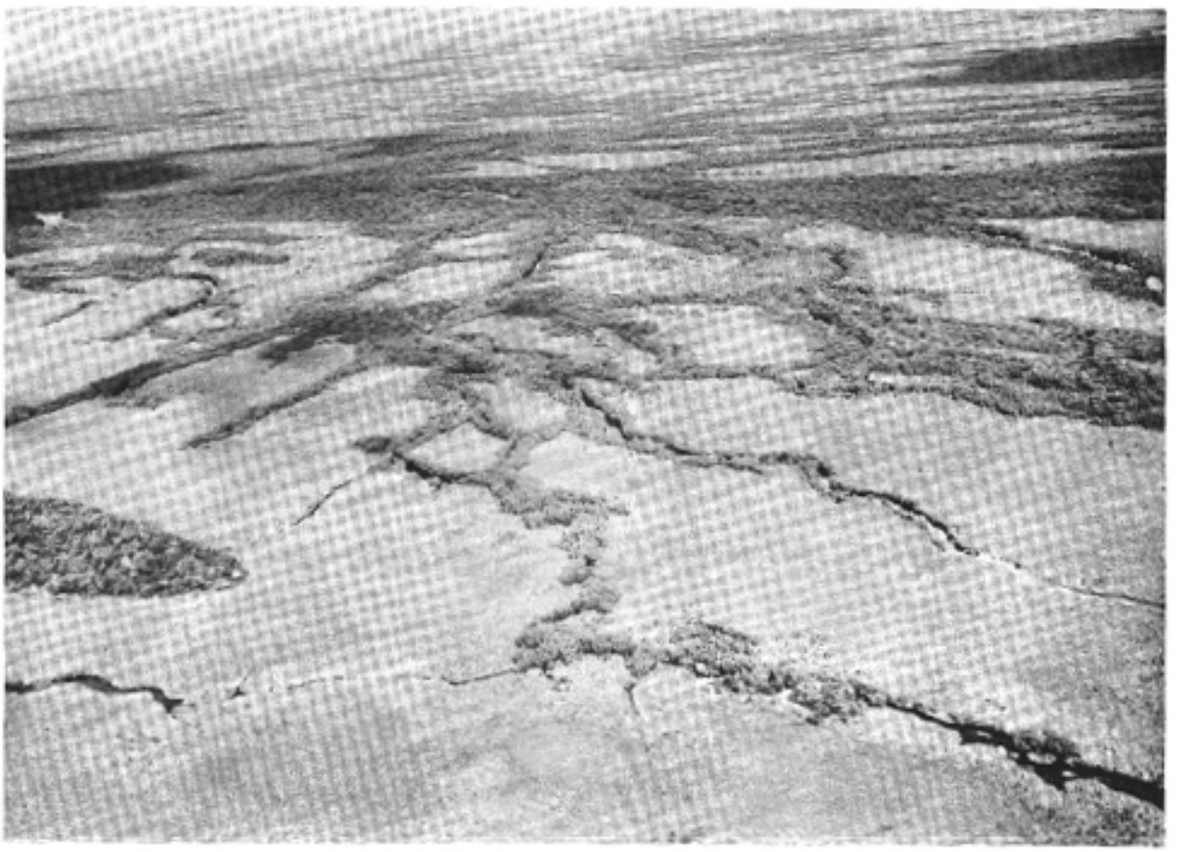


MAP OF ENVIRONMENTS IN TARPON BAY AREA

Figure 46

PLATE XX

a



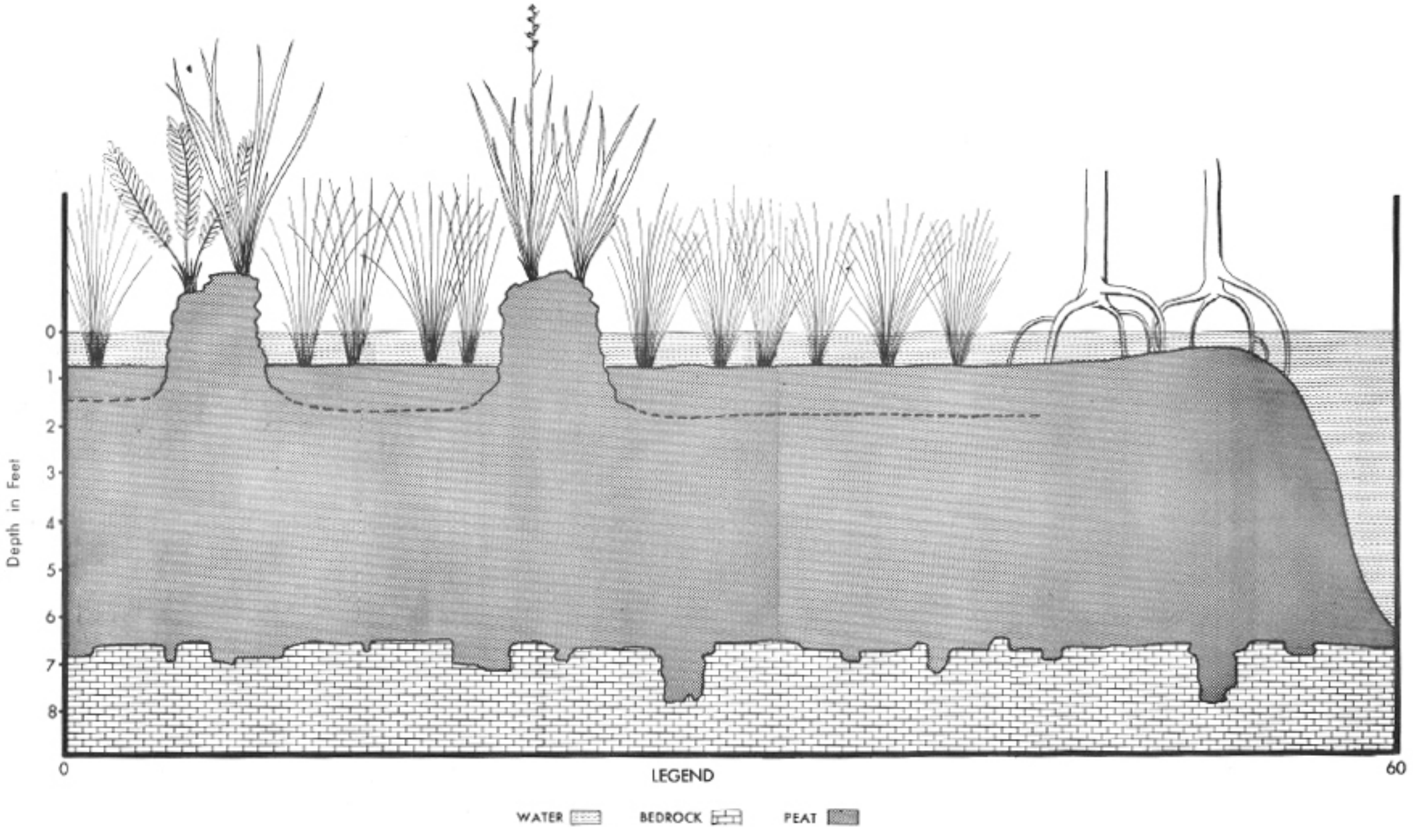
b

PLATE XXI

Of interest at Stop 19 is the occurrence of what may be remnant patches of saw grass marshland growing on mounds of peat at an elevation that is often as much as 2 feet above the level on which the Scirpus marsh is developed. The mounds are composed of saw grass peat and the sides are usually ragged and steep. The appearance is that of an erosional remnant. Figure 47 is a generalized sketch of these observed relationships. If these are erosional remnants of a former surface, as they appear to be, they indicate the removal of vast amount of peat and an appreciable lowering of the surface as an event associated with the marine transgression. At present no radiocarbon dates are available on the upper surface of the mounds and on the sub-Scirpus peat. Such data should be useful in determining whether or not these are evidence of extensive erosion.

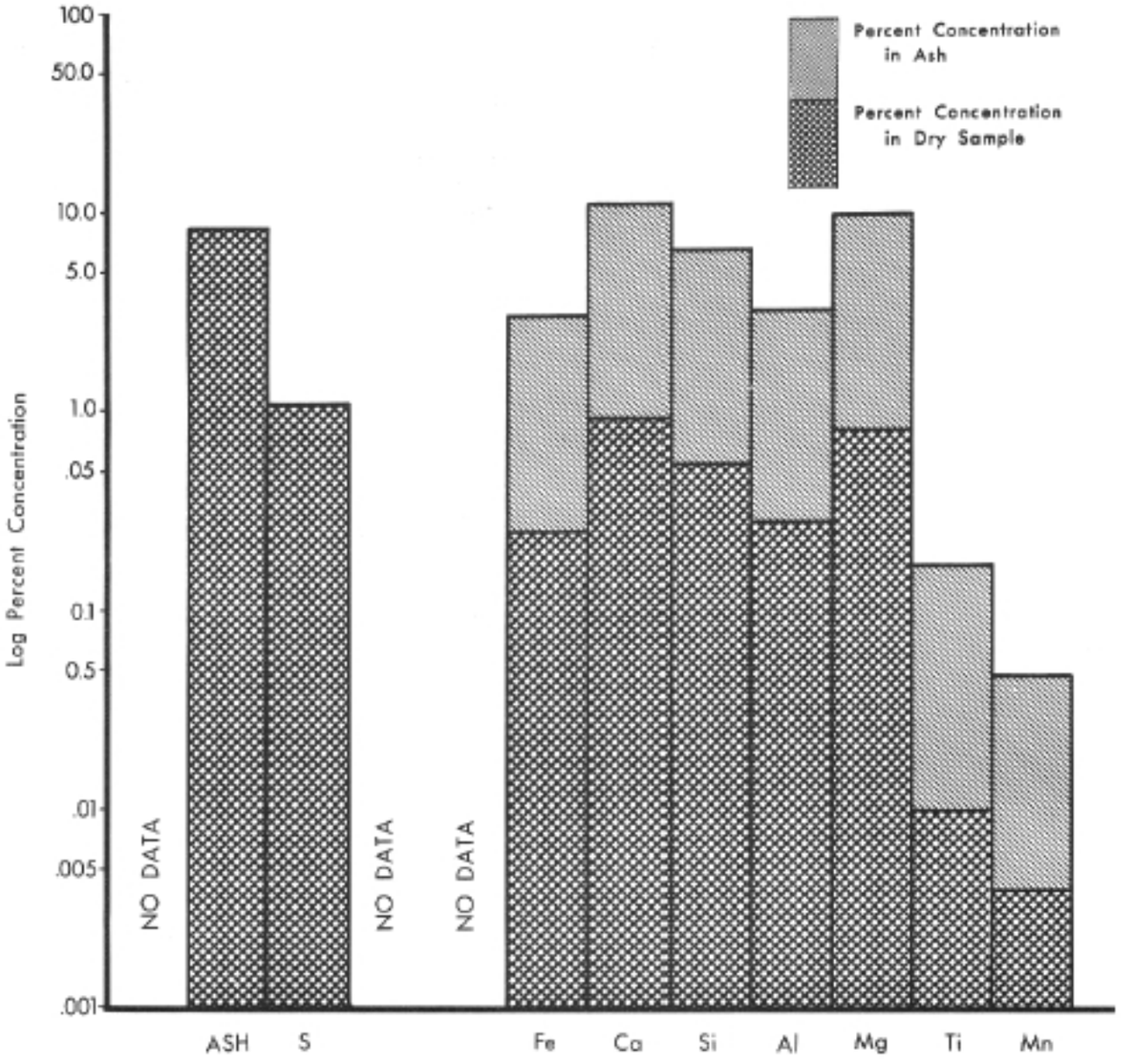
Data on the chemical character and pollen content of the Scirpus marsh sediment are meager and the data presented should be thought of as representing this particular site, as opposed to the Scirpus environment in general. The element concentrations encountered at this site are graphically presented in Figure 48 and should be compared with those of a brackish saw grass site (Figure 14). The values appear quite similar at the two sites except for the significantly higher concentration of sulfur in the brackish saw grass peat. This difference does not appear to be a function of differences in carbon content, for the ash in the saw grass peat is higher than that in the Scirpus sediment. The data amassed to date point rather emphatically to the brackish saw grass marsh and the brackish cat-tail marsh as sites in which high concentrations of sulfur are found in the surface sediments.

In order to determine the extent to which trends in elemental concentrations and pollen content were associated with distance from the open waters of the Gulf, a series of samples was taken in the streamside swamp environment. These were surface samples taken on each side of the Shark and Little Shark Rivers at one mile intervals without regard for the environmental setting involved (i.e. width of the streamside swamp, composition of the streamside swamp at the sampling site, nature of adjacent environments, etc.). The sample locations are plotted on Figure 49, and the chemical data are summarized in Table 3. Several facts that

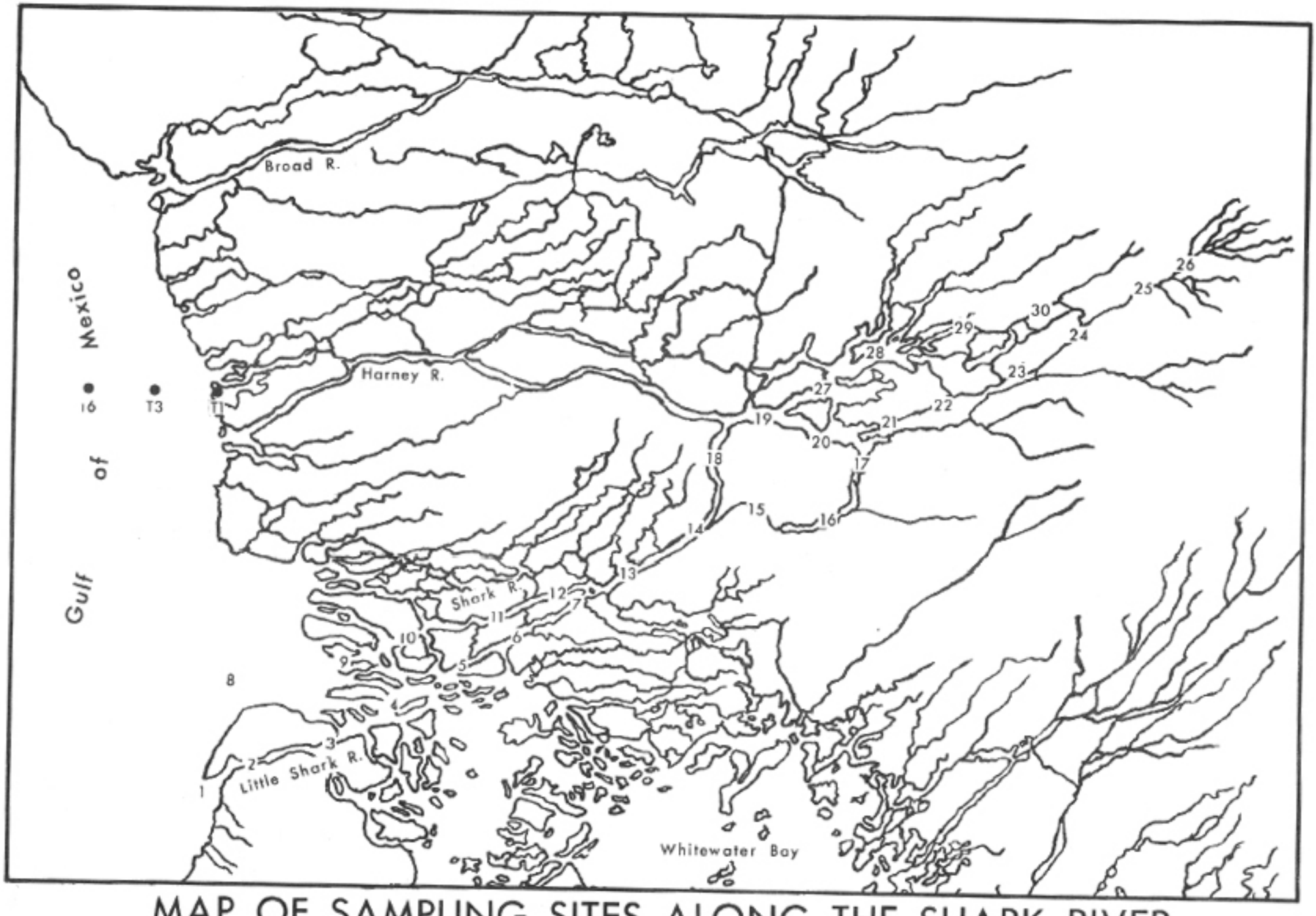


IDEALIZED SECTION THROUGH THE MARGIN OF A TARPON BAY ISLAND SHOWING SAW GRASS PEAT MOUNDS

Figure 47



ELEMENT CONCENTRATIONS IN SURFACE PEAT IN BULRUSH MARSH
Figure 48



MAP OF SAMPLING SITES ALONG THE SHARK RIVER AND THE CORE SITES IN THE BURIED PEAT (59-T1, T3, AND T6)

Figure 49

TABLE 3

Summary of Chemical Data Obtained on

Samples Collected Along the Course of the Shark River

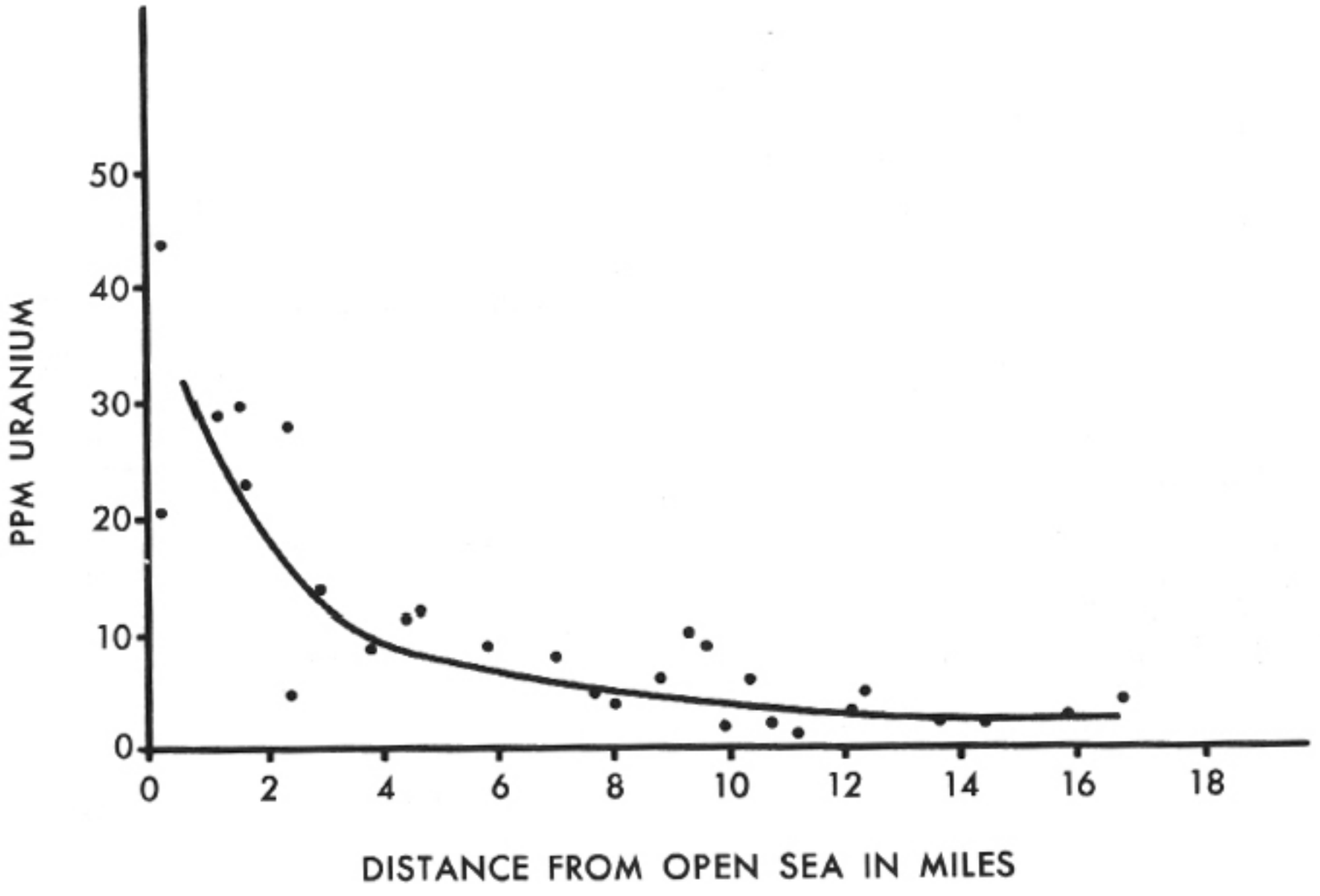
Sample No.	H_2O*	C*	S*	H*	Ash*	Fe*	Ca*	Si*	Al*	Mg*	Ti*	Mn*	U*
1	4.27	12.68	2.57	2.05	68.90	3.6	0.69	16.9	7.8	1.8	0.43	0.0050	0.0021
2	6.73	8.49	1.85	2.13	56.63	1.8	6.1	12.2	2.9	1.4	0.21	0.0028	0.0029
3	6.49	38.03	3.13	3.58	28.17	0.93	1.6	2.4	1.2	1.8	0.06	0.0014	0.0028
4	9.86	34.17	3.17	3.33	34.64	1.4	1.9	5.0	2.0	1.4	0.14	0.0024	0.0030
5	4.06	16.93	0.94	1.04	56.06	0.62	27.0	4.0	0.95	1.3	0.07	0.0026	0.0005
6	12.00	25.40	3.34	2.10	50.91	1.7	6.8	7.7	2.7	1.9	0.18	0.0092	0.0009
7	8.96	36.22	3.05	3.24	32.91	0.86	2.8	6.4	2.3	1.5	0.15	0.0025	0.0012
8	0.52	11.15	0.40	0.33	60.52	0.40	37.3	3.4	0.91	0.28	0.05	0.0014	0.0004
9	8.12	21.00	2.44	1.87	56.51	2.1	3.0	11.8	4.5	1.8	0.26	0.0036	0.0044
10	5.16	30.94	2.93	3.18	40.26	2.1	1.5	5.9	2.4	0.34	0.14	0.0048	0.0023
11	4.98	26.92	2.42	2.85	43.40	1.3	9.4	6.7	0.03	1.4	0.16	0.0037	0.0014
12	4.67	27.84	2.26	2.45	45.85	1.7	6.4	8.6	2.1	1.4	0.16	0.0060	0.0011
13	7.77	38.88	4.29	3.50	29.09	1.1	1.5	4.5	2.4	1.2	0.13	0.0044	0.0009
14	6.02	40.16	3.40	3.79	27.23	1.2	0.92	4.1	1.6	1.2	0.08	0.0033	0.0008
15	5.73	34.61	1.33	3.97	33.05	0.83	3.5	6.3	1.9	1.0	0.09	0.0059	0.0004
16	6.46	44.20	2.39	4.32	13.09	0.42	2.1	2.7	0.90	1.0	0.05	0.0018	0.0010
17	7.68	48.88	2.51	4.76	13.82	0.25	2.4	1.1	0.52	0.94	0.03	0.0050	0.0006
18	4.92	32.86	2.66	5.05	36.03	0.72	4.1	6.8	1.8	1.2	0.12	0.0043	0.0005
19	6.88	45.14	3.23	4.27	17.14	0.41	2.0	1.9	1.1	1.2	0.06	0.0031	0.0006
20	8.62	47.47	1.84	4.20	12.12	0.31	2.4	0.90	0.38	1.4	0.02	0.0037	0.0009
21	6.76	36.06	4.42	3.43	35.82	2.8	8.3	1.5	0.86	1.4	0.06	0.0201	0.0002
22	3.99	23.54	3.08	1.89	54.02	1.8	23.8	2.3	0.24	0.59	0.01	0.0167	0.0003
23	5.35	33.99	4.28	3.00	40.02	3.0	9.9	3.9	0.52	0.80	0.04	0.0204	0.0003
24	5.46	42.56	3.58	4.57	23.14	2.2	6.3	0.65	0.28	0.62	0.01	0.0155	0.0002
25	6.04	48.40	2.50	4.53	17.60	1.8	3.8	0.98	0.30	0.86	0.02	0.0150	0.0003
26	4.48	25.03	4.17	2.26	50.21	2.6	13.0	6.2	3.2	0.75	0.22	0.0171	0.0004
27	6.90	45.33	2.01	4.31	16.24	0.19	3.8	0.39	0.21	1.8	0.01	0.0029	0.0002
28	9.62	49.05	1.99	3.76	20.18	0.44	2.8	0.89	0.20	1.2	0.01	0.0022	0.0001
29	4.47	21.84	2.20	1.74	62.66	1.1	4.5	21.2	0.53	0.69	0.02	0.0075	0.0005
30	7.24	49.94	2.76	4.39	12.64	1.4	2.3	0.87	0.25	0.50	0.02	0.0034	0.0002

* Concentrations in percent.

are of interest will be noted when these data are inspected. For example, the sulfur content exceeds 4.0 percent in nine of the samples and there is no clearly defined trend toward an increase in total sulfur as one approaches more marine conditions. The sulfur measured is exclusive of most of the H_2S originally present in the samples. Essentially all of this would have been lost in the drying, grinding and pulverizing of the samples for analysis. Also of interest is the relationship between the uranium content of the samples and the distance from the open Gulf. This relationship is plotted in Figure 50.

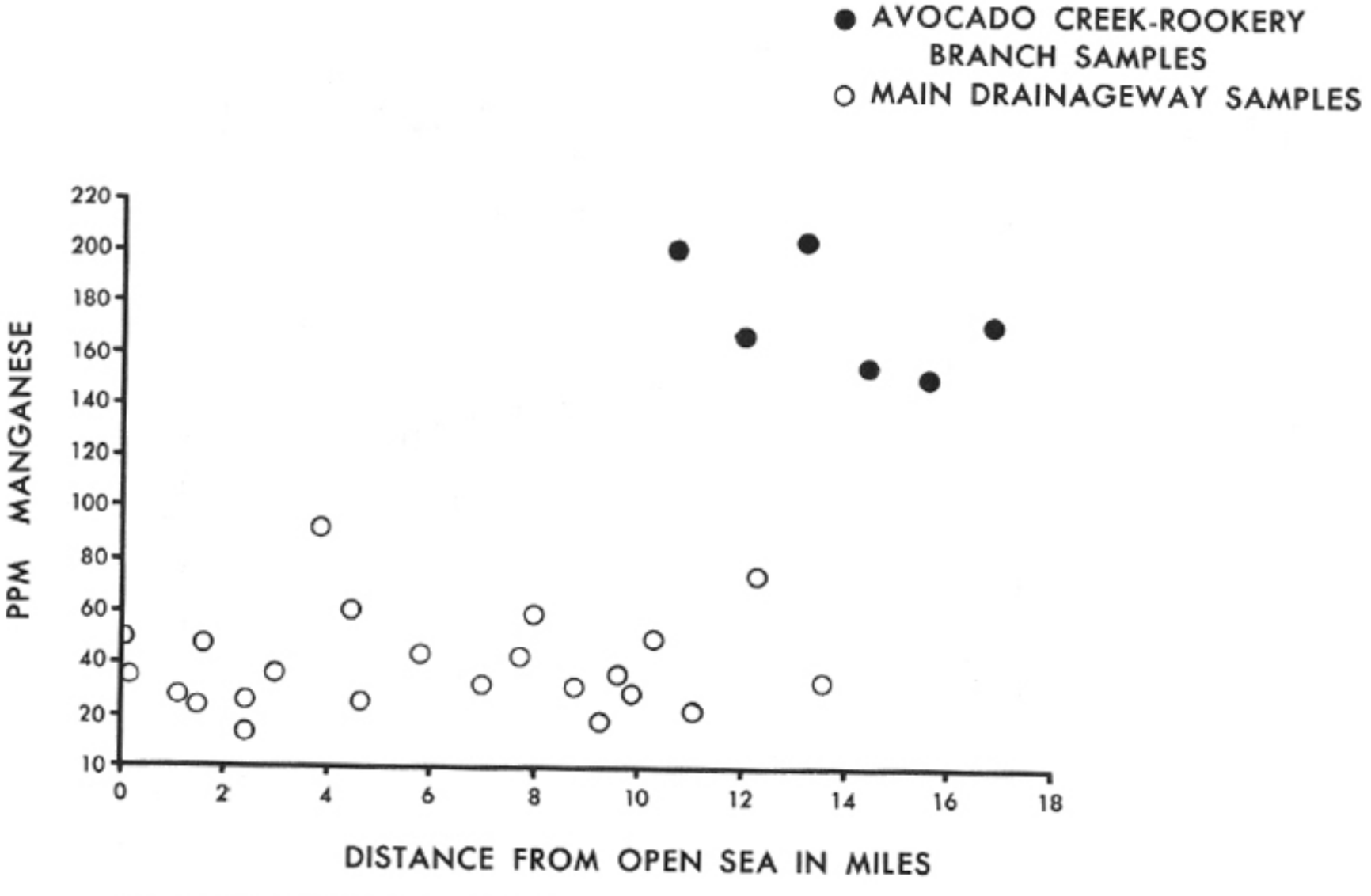
A more thorough discussion of these and other chemical data from this general area will be presented in a series of papers now in preparation. Of significance for present purposes, however, is the concentration of manganese in certain of the inland brackish sites. Figure 51 shows that there are two populations of samples as far as manganese content is concerned. One includes the sites along the main drainageway and the samples in this population usually contain fewer than 50 ppm of manganese. In contrast, the Avocado Creek - Rookery Branch sites all contain greater than 150 ppm of this element. Thus it would appear that some, but not all, inland brackish environments in this area are characterized by a concentration of manganese that is about three times as great as most of the more marine sites.

Some of the palynological data collected on the river bank samples are presented in Table 4. The salient trends shown by these data are diagrammatically represented in Figure 52. As is evident, and as would be expected from a knowledge of the present vegetational distribution patterns, pollen derived from red mangrove is represented in the largest concentrations at the coastline. Proceeding upstream there is a progressive decrease in the amount of Rhizophora pollen until it constitutes only 1-2 percent of the total pollen present in the sediment. (Sampling Site No. 30 apparently represents a localized and atypical concentration of Rhizophora.) Conversely, the pollen of Chenopodiaceous affinities is usually present in only small quantities in most of the marine samples and reaches its peak concentration in the headwaters areas. Thus, these two pollen types, particularly when used in combination, may provide a



DISTRIBUTION OF URANIUM ALONG THE SHARK RIVER

Figure 50



DISTRIBUTION OF MANGANESE ALONG THE SHARK RIVER

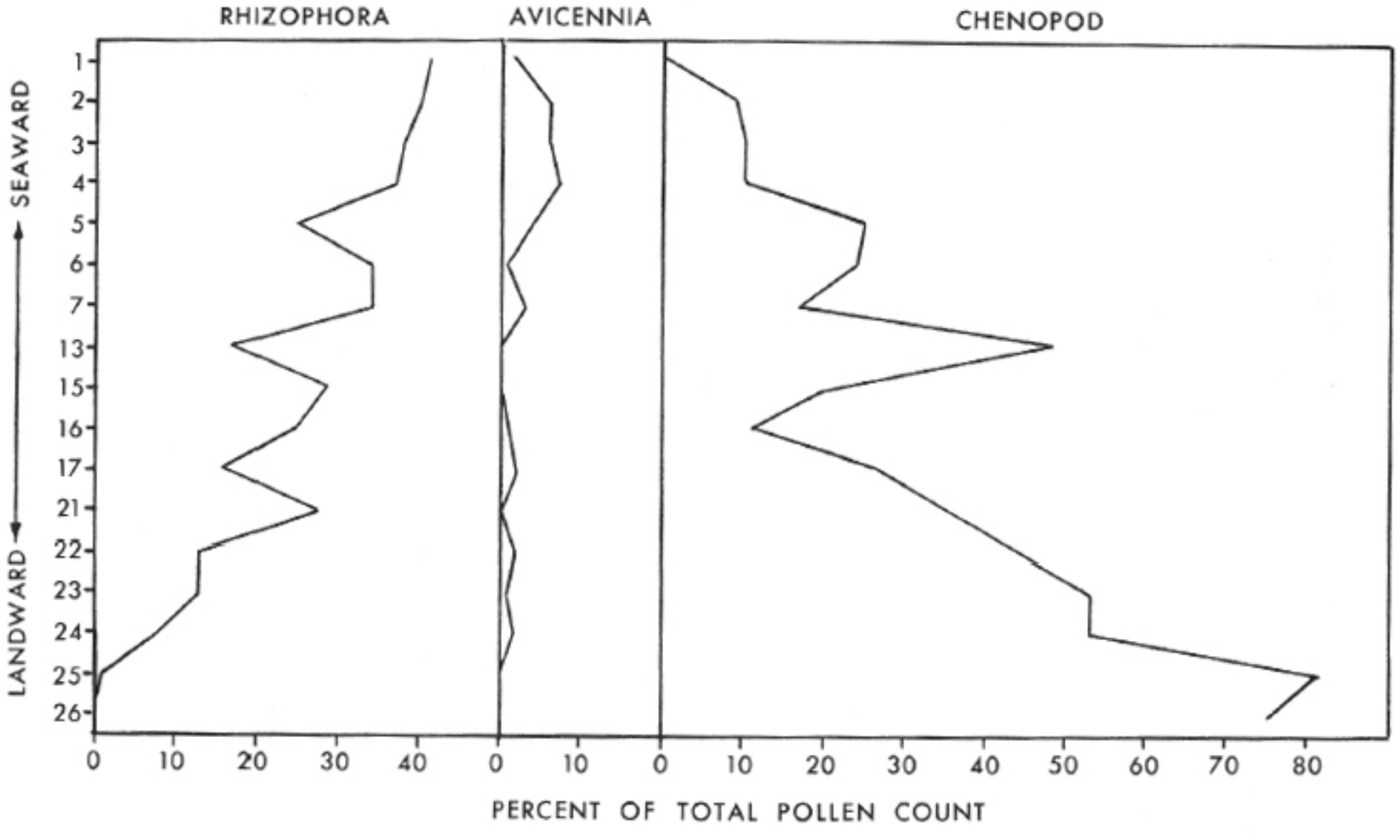
Figure 51

TABLE 4

Summary of Palynological Data Obtained on Samples Collected Along the Course of the Shark River

Locality No.	Pollen Types in Percent			
	Rhizophora	Avicennia	Chenopodiaceae	Other Pollen
1	41	2	0	57
2	40	6	9	45
3	38	6	10	46
4	37	7	10	46
5	25	3	25	47
6	34	1	24	41
7	34	3	17	46
9	48	3	6	43
10*	-	-	-	-
11*	-	-	-	-
12*	-	-	-	-
13	17	0	48	35
14*	-	-	-	-
15	29	0	20	51
16	25	1	11	63
17	16	2	27	55
18	31	0	33	36
19	20	2	25	53
20	22	0	32	46
21	27	-	35	38
22	13	2	44	41
23	13	1	53	33
24	8	2	53	37
25	1	0	81	18
26	0	0	75	25
27*	-	-	-	-
28	2	0	80	18
29	3	0	90	7
30	25	3	14	58

* Pollen too rare to warrant count.



DISTRIBUTION OF MAJOR POLLEN TYPES IN THE SEDIMENTS ALONG THE SHARK RIVER

Figure 52

useful index to the environmental site - shoreline relationships when the conditions are comparable to the area herein described. Also of interest is the concentration of Avicennia pollen in the various samples. The pollen of this plant is most commonly represented in the marine to brackish zone just behind the coast and disappears from the sediment before the headwaters are reached. Therefore, the pollen concentration in the sediment accurately reflects the greater areal distribution of Rhizophra and the comparatively restricted range of Avicennia. All of the sources of the Chenopodiaceous pollen have not as yet been ascertained, hence the relationship of these pollen concentrations to the source plants cannot be stated. It seems apparent, however, that a large concentration of Chenopodiaceous pollen associated with a very small representation of Rhizophora pollen reflects the brackish to fresh-water transition zone in this area (salinity of 200 ppm NaCl). A more or less equal representation of these two pollen types plus a reasonable amount of Avicennia pollen is an index of brackish environment (salinity of ca. 4000 ppm) and a large concentration of Rhizophora pollen, with little or none of the other two represented, is a reflection of the type of marine conditions prevalent along the coastline (salinity of 36,000 ppm).

STOP 21: Buried Peat Site

Objectives:

A. Procurement and inspection of cores of the sediment sequence one-half mile off the western coast of Florida.

B. Discussion of the age of the sediment, elemental concentrations and pollen content in onshore and offshore cores taken in an E-W transect.

C. Discussion of the evidence for marine transgression provided by the core data.

D. Summary of the distribution of phytogenic sediments in southwestern Florida.

Discussion:

Davis (1940) pointed out that the thickness of the peat near the mouth of the Shark River was far greater than the tidal range and he inferred